active XOR and the second portion comprising a nutritional formulation suitable for a human infant.

Remarks

Claims 1-18, 32, 35, and 38-39 remain pending after entry of this office action. Claim 11 has been amended herein. The amendments were made to more fully clarify the subject matter and have not added new subject matter. Favorable reconsideration is respectfully requested in light of the above amendments and the comments offered herein.

The Examiner maintained the rejection of claim 11 under 35 U.S.C. § 112, second paragraph. Applicants respectfully traverse this rejection.

The Examiner maintained the rejection of claims 1, 7-8, 11, 15, and 33-34 under 35 U.S.C. § 102(b) as begin anticipated by Cooray et al. Applicants respectfully traverse this rejection.

The Examiner maintained the rejection of claims 1-4, 6-11, 14-17, and 33-34 under 35 U.S.C. § 102(b) as being anticipated by Clark et al. Applicants respectfully traverse this rejection.

The Examiner maintained the rejection of claims 1-17 and 33-34 under 35 U.S.C. § 102(b) as being anticipated by Ho et al. Applicants respectfully traverse this rejection.

The Examiner maintained the rejection of claims 1, 6-10, and 33-34 under 35 U.S.C. § 102(b) as being anticipated by De Jong et al. Applicants respectfully traverse this rejection.

The Examiner maintained the rejection of claims 1-18 and 33-35 under 35 U.S.C. § 103(a) as being unpatentable over Björck et al., Ho et al., Clark et al., Zikakis, Antrim et al., and De Jong et al. in view of Reddy et al. Applicants respectfully traverse this rejection.

35 U.S.C. § 112 Rejection

The Examiner rejected claim 11 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter with Applicants regard as the invention. Specifically, the Examiner asserts that it is the

nature of the second portion that is vague and definite. Claim 11 has been amended to clarify that the second portion is a nutritional formulation suitable for human infants. Applicants respectfully assert that this clearly indicates what the second portion is. Applicants respectfully assert therefore that this rejection should be withdrawn in view of the amendments made herein.

35 U.S.C. § 102 Rejections

The Examiner maintained the rejection of claims 33-34 under 35 U.S.C. § 102(b) as being anticipated by Björck et al.

The Examiner maintained the rejection of claims 1, 7-8, 11, 15, and 33-34 under 35 U.S.C. § 102(b) as begin anticipated by Cooray et al.

The Examiner maintained the rejection of claims 1-4, 6-11, 14-17, and 33-34 under 35 U.S.C. § 102(b) as being anticipated by Clark et al.

The Examiner maintained the rejection of claims 1-17 and 33-34 under 35 U.S.C. § 102(b) as being anticipated by Ho et al.

The Examiner maintained the rejection of claims 1, 6-10, and 33-34 under 35 U.S.C. § 102(b) as being anticipated by De Jong et al.

Applicants respectfully assert that the Examiner is incorrect in interpreting the phrase "formula feed" as encompassing compositions that contain cows' milk. Applicants respectfully assert that the phrase "formula feed" should be interpreted as it would be by those of ordinary skill in the art. As a showing of what one of ordinary skill in the art would consider "formula feed" to mean, Applicants have included a copy of a brochure entitled "Weaning your Baby" published by the Department of Health and the National Health Service in the UK. This document shows that one of ordinary skill in the art would understand that the phrase "formula feed" refers to compositions that d o **not** include cows' milk.

Referring to the brochure from the UK, Applicants wish to draw the Examiner's attention to the following. At page 6, "Cow's milk - OK for mixing foods or in cooking from six months onwards but not as a drink until your baby is one year old." At page 7, "Remember cow's milk should not be given as a drink until your baby is one year old" and "Keep to your baby's usual milk for a main drink, i.e., breast milk or 500-600 ml (1

pt) of formula or follow-on milk". At page 9, "Infant formula can be used for babies up to one year and beyond, or start giving full-fat cow's milk at one year" and "Don't use cow's, goat's, or sheep's milk as a main drink before one year".

Applicants respectfully assert that it is clear from the above that cow's milk is not understood by those of ordinary skill in the art as being a "formula feed" for administration to a human infant *as a breast milk substitute.* The brochure from the UK shows in particular that the phrase "formula feed" is clearly understood by those of skill in the art as excluding cow's milk by making it clear that formula milk is suitable in some contexts where cow's milk is specifically advised against. Those statements would make no sense if, as the Examiner asserts, cow's milk is merely a sub-species of formula feed. The brochure also suggests that the assertion that cow's milk is *suitable* as a substitute for breast milk for infants is highly questionable, as it clearly implies that cow's milk should not be given to babies of younger than six months and should not be given as a drink until one year.

The objections under 35 U.S.C. § 102 are based on the premise that the phrase "formula feed" includes compositions that have raw cow's milk per se. It is submitted, for the reasons given above that are supported by the UK Department of Health brochure attached hereto, that those objections are unjustified.

Applicants also include a copy of the United States Infant Formula Act (21 U.S.C. § 350A) from which it can be seen that an infant formula in the United States is required to comply with certain nutritional standards. The specific nutritional standards for infant formula can be found in the table at 35 U.S.C. § 350A(i). Applicants respectfully assert that one of skill in the art would understand the phrase "formula feed" as having similar nutrients in similar amounts. Applicants also respectfully assert that the prior art cited by the Examiner does not disclose compositions that have nutritional profiles anything like what one of skill in the art would consider as a formula feed.

Applicants respectfully assert that none of the cited references teach a composition which could be used as a formula feed for administration to a human infant as a breast milk substitute. In light of the above comments Applicants respectfully request that the rejections of the claims under 35 U.S.C. § 102(b) be withdrawn.

35 U.S.C. § 103 Rejection

The Examiner rejected claims 1-18 and 33-35 under 35 U.S.C. § 103(a) as being unpatentable over Björck et al., Ho et al., Clark et al., Zikakis, Antrim et al., and De Jong et al. in view of Reddy et al.

Applicants respectfully assert that the Examiner has failed to make out a *prima facie* case of obviousness. In order to establish *prima facie* obviousness, three basic criteria must be met, namely: (1) there must be some suggestion or motivation to combine the references or modify the reference teaching; (2) there must be a reasonable expectation of success; and (3) the reference or references when combined must teach or suggest each claim limitation. Applicants submit that the Office Action failed to state a *prima facie* case of obviousness at least because there is no suggestion or motivation to combine the references. Therefore the burden has not properly shifted to Applicants to present evidence of nonobviousness.

Björck et al describes experiments which are alleged to show that addition of a substrate for xanthine oxidase, such as hypoxanthine, leads to an antibacterial effect resulting from the lactoperoxidase-catalyzed oxidation of thiocyanate by hydrogen peroxide to hypothiocyanate, which is asserted to be the active antibacterial agent. According to Björck, the addition of hypoxanthine leads to the generation of hydrogen peroxide through the action of xanthine oxidase. Björck also shows that the activity of xanthine oxidase is milk is more than sufficient to generate a "non-limiting" amount of hydrogen peroxide. According to the teaching of Björck, therefore, a substrate for xanthine oxidase is added to milk. There is no teaching in Björck regarding the activity of xanthine oxidase in formula feeds, which during manufacture have generally been subjected to treatments in which the activity of the xanthine oxidase is reduced to low or negligible levels. Thus there is no recognition in Björck that it might be necessary or desirable to add active xanthine oxidase to a formula feed. Björck teaches, instead that milk already contains active xanthine oxidase and the skilled person reading Björck would have drawn no suggestion from Björck that the addition of xanthine oxidase would have been fruitful, because Björck teaches that xanthine oxidase is already present in milk in excess.

Ho et al sets out to investigate three areas: absorption of milk XO via the lymphatic system; the effect of oral fat on serum XO concentration; and the possibility that milk XO might be a source of riboflavin (see inter alia the Abstract). Ho et al investigates the administration of half cream/half milk ("H/H") fortified with XO to cockerel chicks, and is concerned mainly with systemic uptake of XO. There is no teaching in Ho et al with regard to any antibacterial effect of XO. Applicants respectfully assert that there would have been no reason for one of skill in the art, reading Ho et al, which is concerned principally with systemic uptake by chicks, to combine Ho's teaching with the teaching of Björck, which relates to antibacterial systems in the digestive system. Moreover, there is no disclosure in Ho et al to suggest that the incorporation of XO in formula feed for a human infant would be desirable or advantageous.

Like Ho et al, Clark et al is concerned with investigating systemic uptake of XO. Although a number of hypotheses of earlier authors are mentioned on page 887, there is no clear teaching as to what benefits the inclusion of XO in diet might give (see the Discussion on pages 890 and 891). There is also no disclosure whatsoever to suggest the inclusion of active XO in a formula feed for human infants, nor that such a formula feed would be advantageous.

Zikakis describes and claims a milk xanthine oxidase active enzyme concentrate having an average protein to flavin ratio of 2.0 to 4.1. Zikakis's objective is to make a high purity of XO enzyme concentrate for use in research (see col. 12, lines 1 to 4). There is nothing in Zikakis to point towards the use of the enzyme concentrate for administration to human infants, and more particularly Zikakis provides no incentive to incorporate the enzyme concentrate disclosed in a formula feed for human infants.

Antrim et al describes water-in-oil emulsions containing fish oil, which are said to be useful for economic and health reasons to replace vegetable oils (col. 1, lines 15 to 20). The emulsions contain a deodorizing composition, which may include xanthine oxidase. The teaching of Antrim et al is thus that XO ca be an active component of a deodorizing system. The XO in Antrim is utilized for an entirely separate purpose, and therefore, its teaching would not motivated one of skill in the art to combine it with the teachings of the other reference. Antrim provides no useful teaching to the skilled person seeking to make an improved formula feed.

De Jong et al is concerned with long-term preservation of food products. De Jong does not contain any disclosure regarding antibacterial activity post-ingestion. The use of XO is disclosed as one of a number of possible oxidoreductases which may be included in food for the purpose of generating hydrogen peroxide for use in lactoperoxidase-catalysed conversion of thiocyanate to hypothiocyanate (see col. 4, lines 22 to 26). There is no explicit teaching of adding XO to any specified food product. The Examples include glucose oxidase (Examples 1 to 5) with lactoperoxidase only (Examples 1 and 3), cellulase (Example 2), amylase and amyloglucosidase (Example 4), and amyloglucosidase and lactoperoxidase (Example 5). Furthermore, De Jong teaches immobilisation of the enzymes (see claim 1 and, for example, col. 5, lines 56 to 63). The immobilisation materials mentioned (e.g. at col. 5, lines 60 to 63 to col. 6, line 6) would not be regarded as suitable for inclusion in the infant diet or, more particularly, in formula feed. It is submitted that there is no incentive whatsoever in De Jong to include active XO in a formula feed for human infants.

Reddy et al describes and claims a moisture activated system for reducing pollution or spoilage. The system includes a moisture activated means for supplying a predetermined, water dispersible oxygen inducer; a carrier means for said moisture activated means; and a biochemical oxygen-releasing means. The means for supplying a predetermined, water-dispersible oxygen inducer may be a variety of different enzymes (see, for example, claim 2). In the "Micro-prep" of Table 3 (col. 7), eight different enzymes are present, not including xanthine oxidase. In Example 8, a "micro-prep" is combined with raw milk, and is said to increase the shelf life of raw milk. The micro-prep of Example 8 is said to contain lactoperoxidase enzyme, glucose oxidase and lactase. Further, it is stated that "In this preparation catalase does not have to be added because raw milk contains trace amounts of this enzyme." There is no corresponding statement about xanthine oxidase, which implies that only the catalase is relevant for the purpose of Reddy. It is submitted that, without the benefit of hindsight, there would have been nothing in Reddy et al to lead the skilled person to make a formula feed comprising active xanthine oxidase.

Furthermore, the teaching of Reddy et al does not, in combination with any of the other cited documents, lead to the invention. Thus, the absence of any reference in

Reddy et al to xanthine oxidase, the skilled person reading Björck, Ho, Clark, Zikakis, Antrim or De Jong would have been led to consider enzymes other than xanthine oxidase, and thus Reddy et al teaches away from the present invention.

In summary, Applicants respectfully assert that one of skill in the art would not have been motivated to combine the teachings of any of the references. Furthermore, even if one of skill in the art had been motivated to combine the references, Applicants respectfully assert that the combination thereof would not have provided or suggested all of the elements of the Applicants invention. Therefore, because the cited references or combinations thereof do not teach or suggest all of the claim limitations, Applicants respectfully request the withdrawal of this rejection.

Conclusion

In view of the amendments and comments presented herein, favorable reconsideration in the form of a Notice of Allowance is respectfully requested.

Respectfully submitted,
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Date: 4/8/03

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Version with Markings to Show Changes Made

In the Claims

Please amend claim 11 as follows:

11. (Fourth Amendment) A kit for use in the preparation of a formula feed according to claim 1, comprising a first and second portions, the first portion [including] comprising active XOR and the second portion [being sterile] comprising a nutritional formulation suitable for a human infant.